US005566737A

United States Patent [19]

Erber

[11] **Patent Number: 5,566,737**

[45] **Date of Patent: Oct. 22, 1996**

[54] **LOUVERABLE ROLLER BLIND**

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[21] Appl. No.: **284,425**

[22] PCT Filed: **Apr. 20, 1993**

[86] PCT No.: **PCT/AT93/00066**

§ 371 Date: **Aug. 3, 1994**

§ 102(e) Date: **Aug. 3, 1994**

[87] PCT Pub. No.: **WO93/21417**

PCT Pub. Date: **Oct. 28, 1993**

[30] **Foreign Application Priority Data**

Apr. 21, 1992 [AT] Austria 812/92

[51] **Int. Cl.**[6] **E06B 9/08**

[52] **U.S. Cl.** **160/133**; 160/201; 49/86.1

[58] **Field of Search** 160/133, 201; 49/86.1, 74.1

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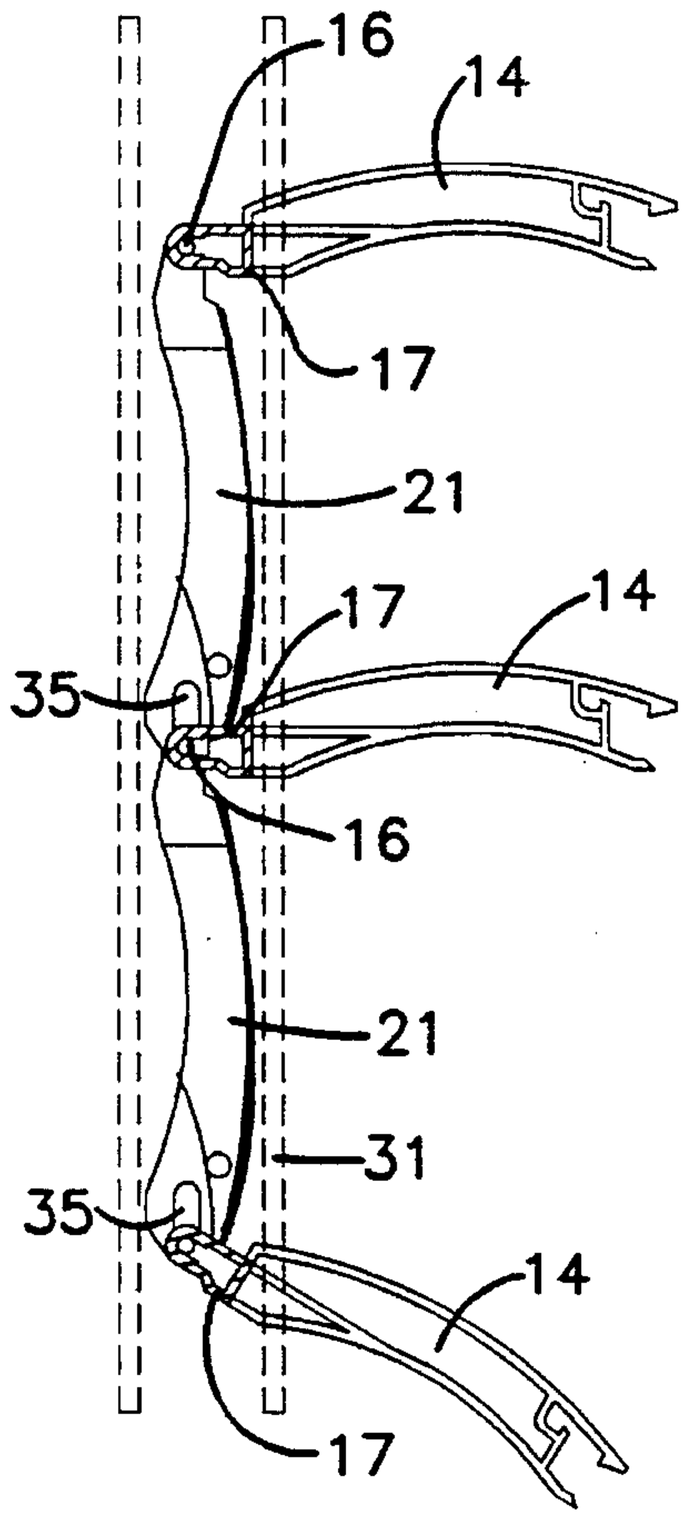
Primary Examiner—Blair Johnson

Attorney, Agent, or Firm—Young & Thompson

[57] **ABSTRACT**

A louverable roller blind has lamellar blind slats (**14**), similar to Venetian blind slats, hingedly linked at their upper areas to pull chain elements (**21**, **40**) and at their lower areas to adjusting chain elements (**23**, **41**). The blind slats (**14**) are further laterally guided in stationary guide profiles (**31**). Pins (**32**) that connect the adjusting chain elements (**23**, **41**) to the blind slats (**14**) are spaced apart from a plane in which hinge pins (**30**) of the adjusting chain elements (**23**, **41**) are located. The hinge pins (**30**, **32**) that link the pull chain elements (**21**, **40**) and the adjusting chain elements (**23**, **41**), as well as swivelling pins (**16**) of the blind slats (**14**), are mutually aligned when the roller blind is not used as a Venetian blind. This alignment allows the roller blind to be rolled up without problems in a reduced space and to be used as a Venetian blind with no need for special aids.

12 Claims, 4 Drawing Sheets



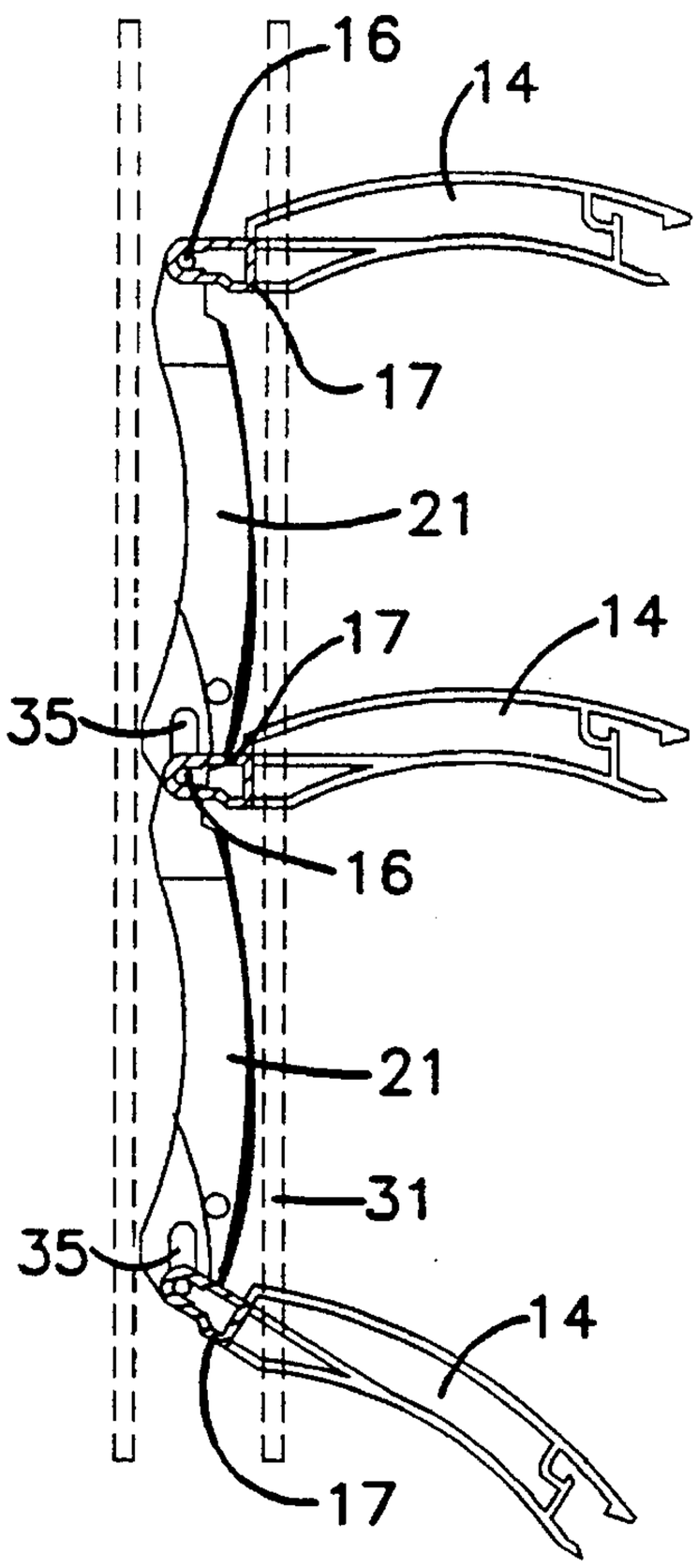


FIG. 1

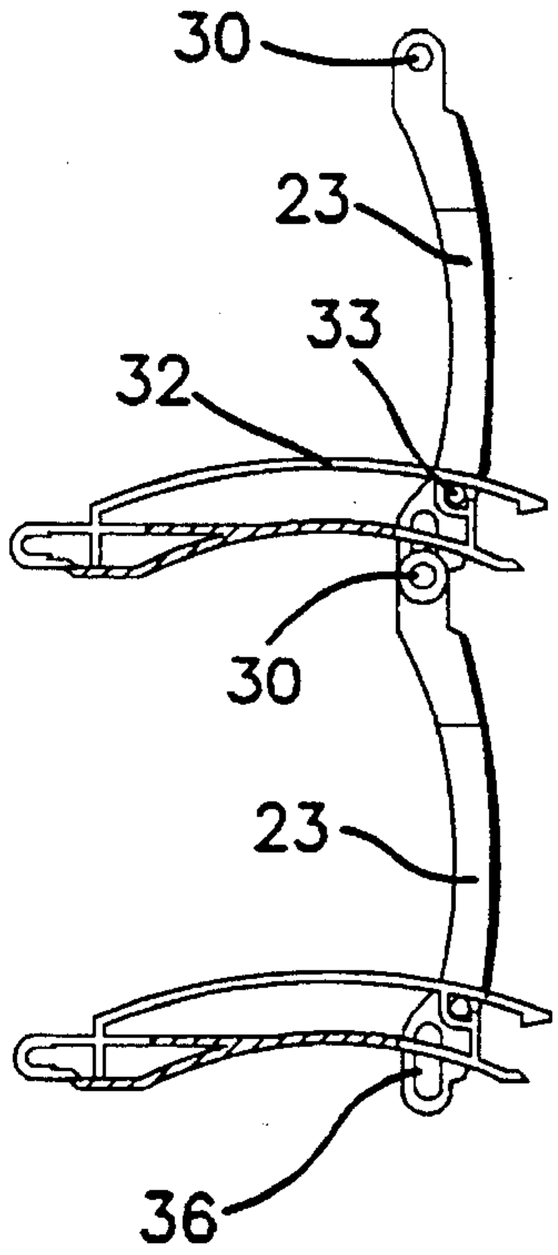


FIG. 2

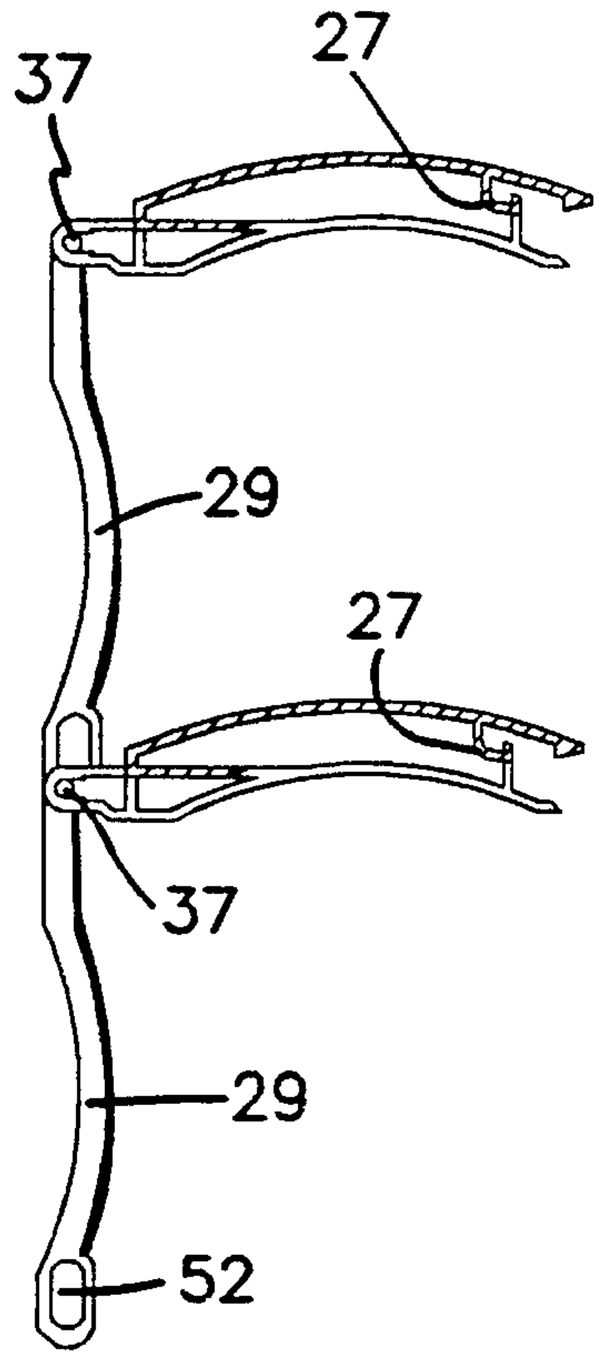


FIG. 3

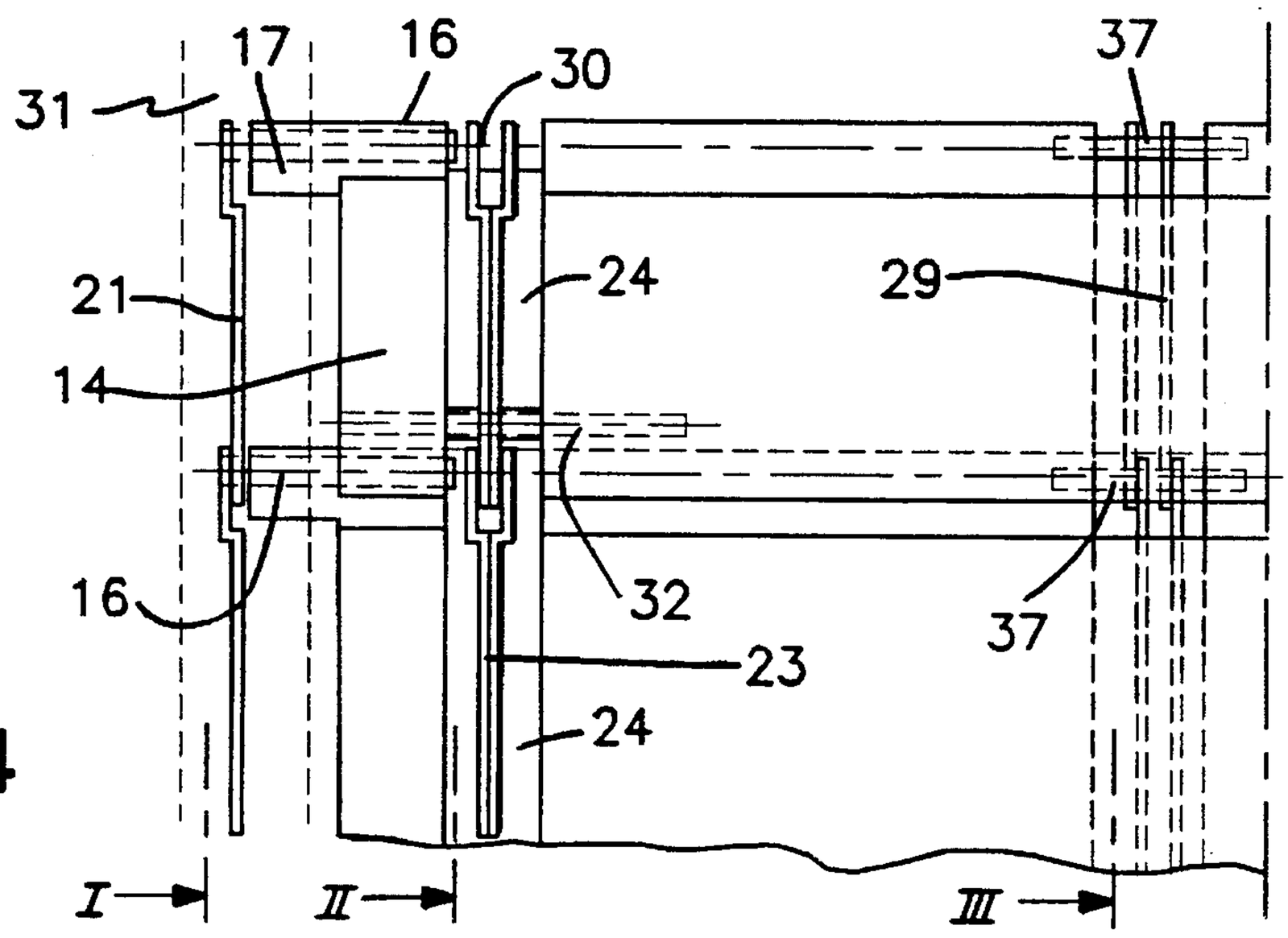


FIG. 4

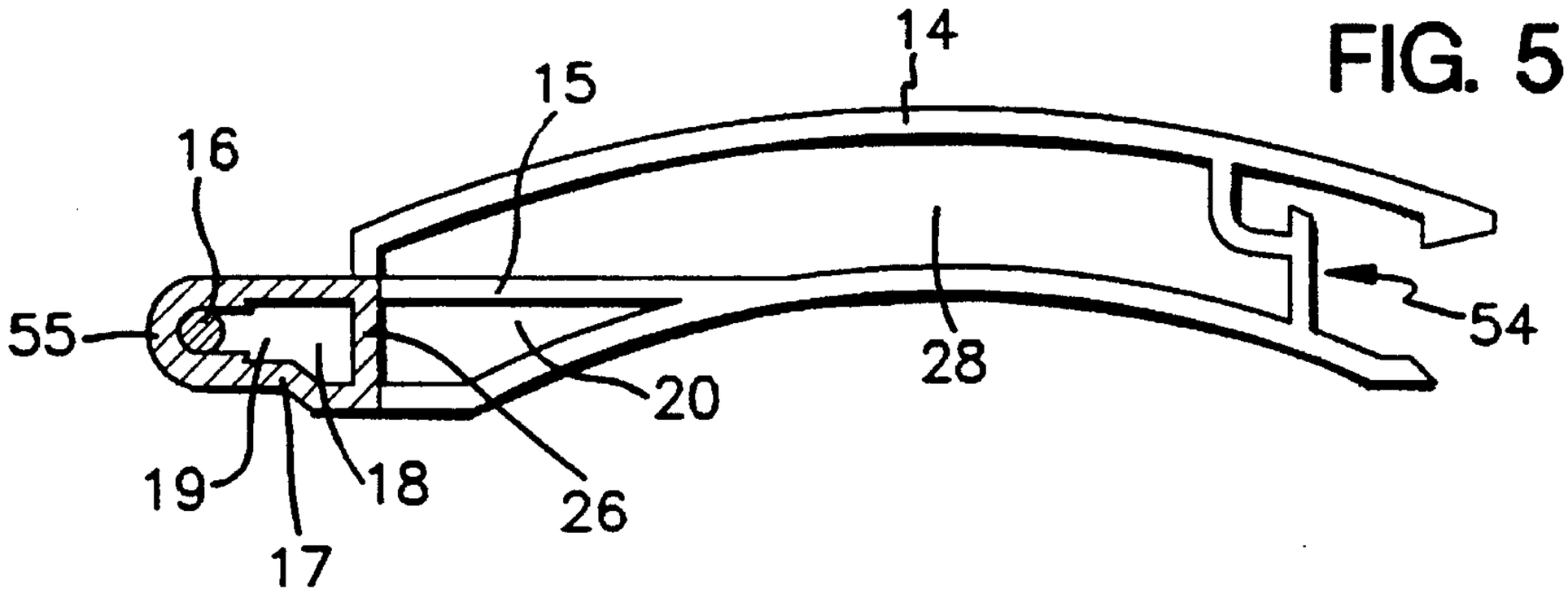


FIG. 5

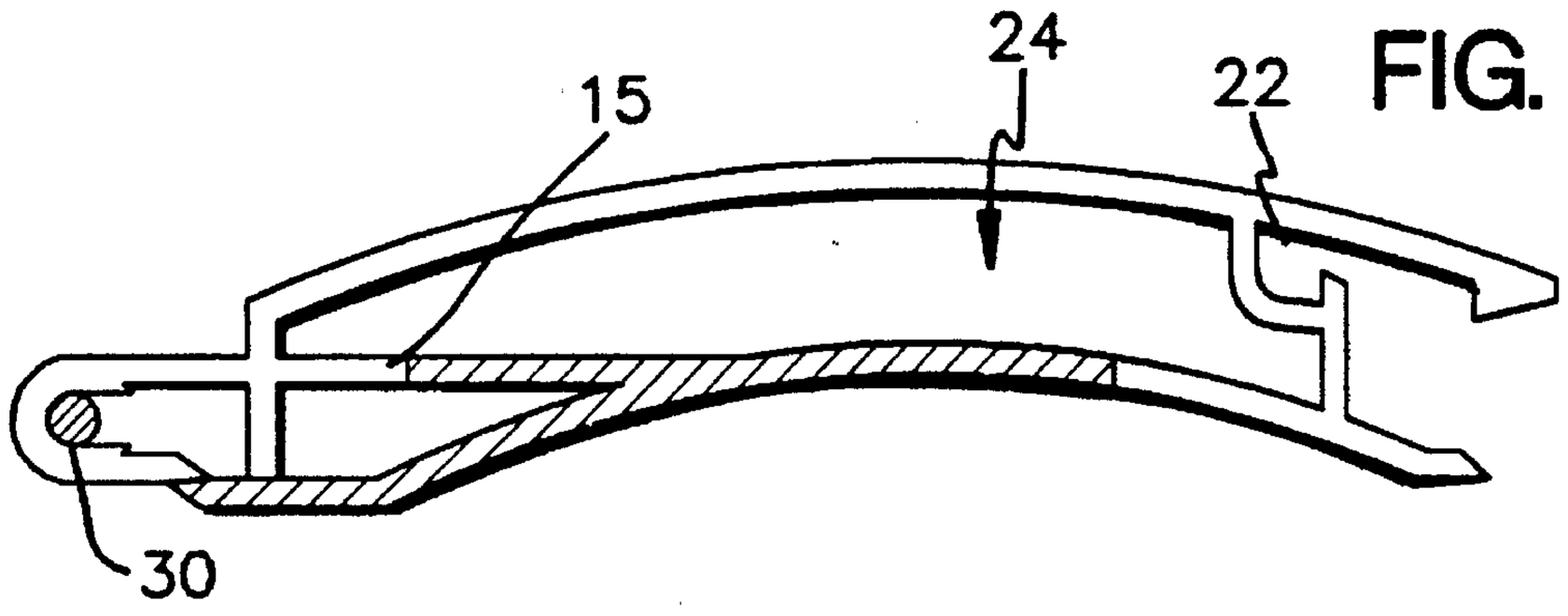


FIG. 6

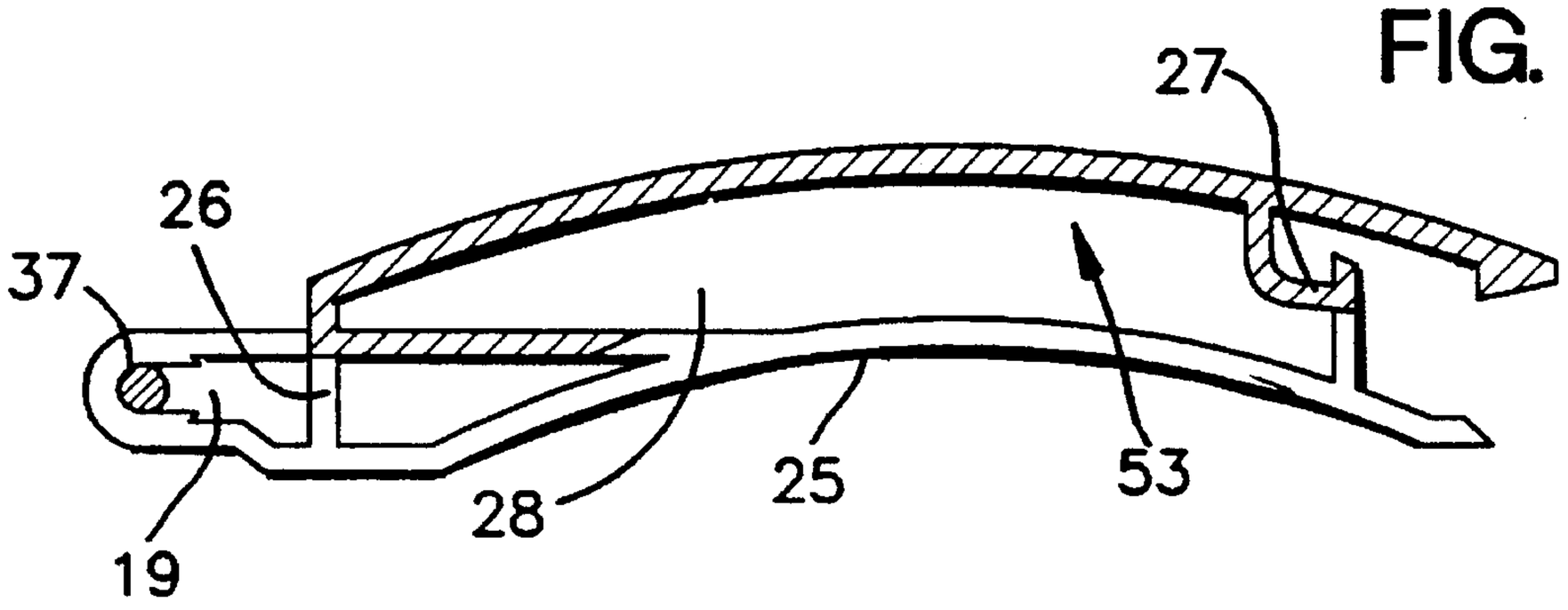


FIG. 7

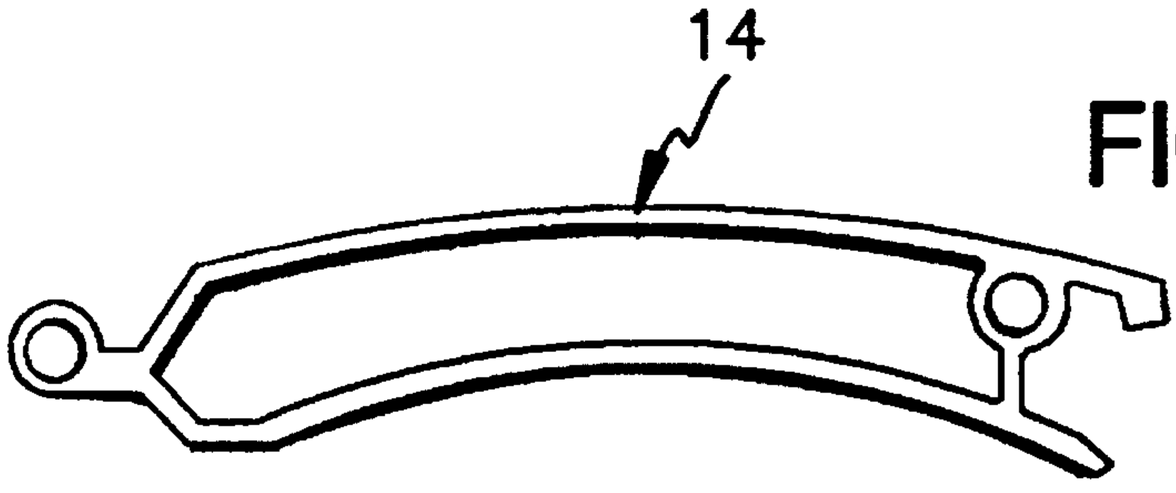


FIG. 8

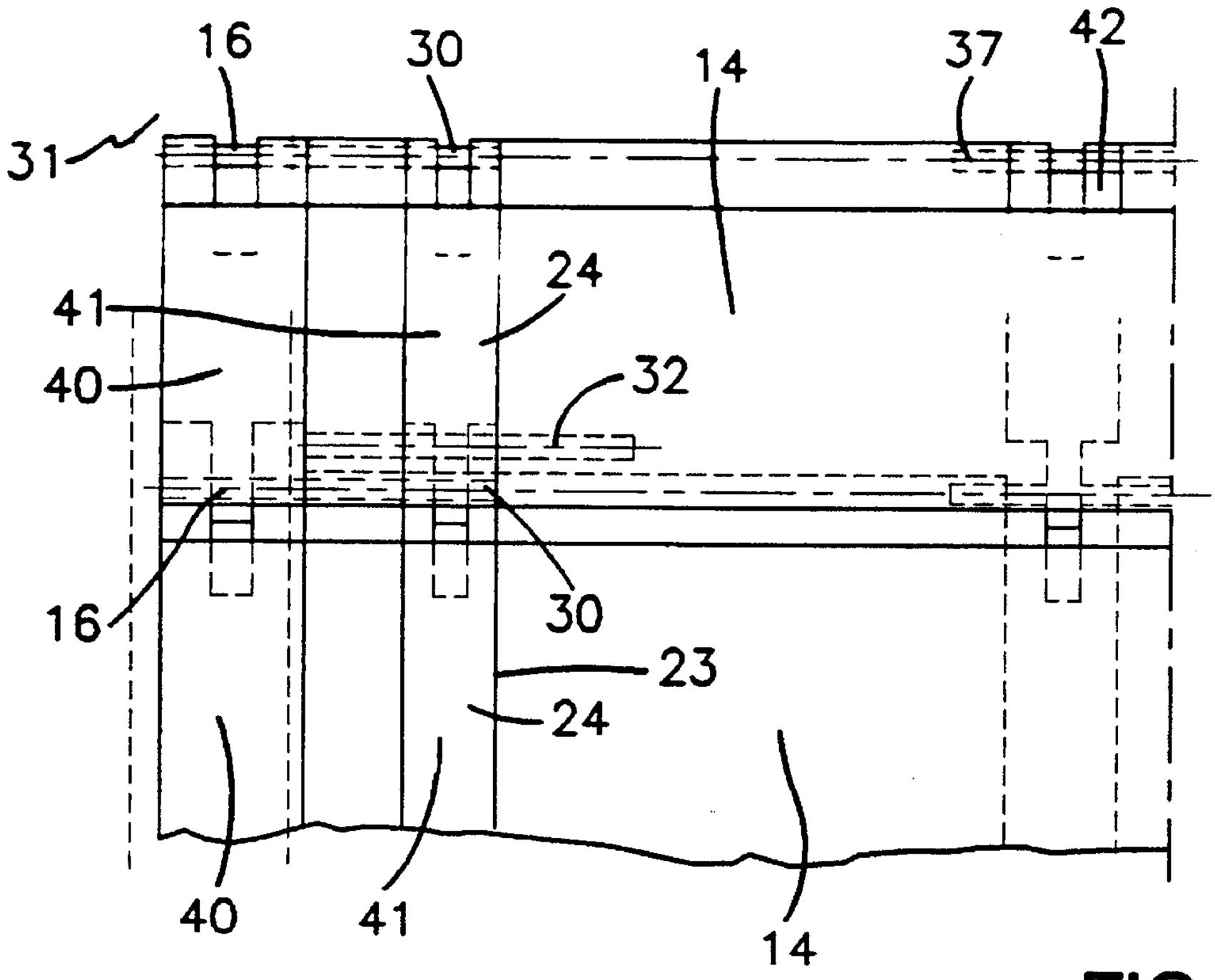


FIG. 9

FIG. 10

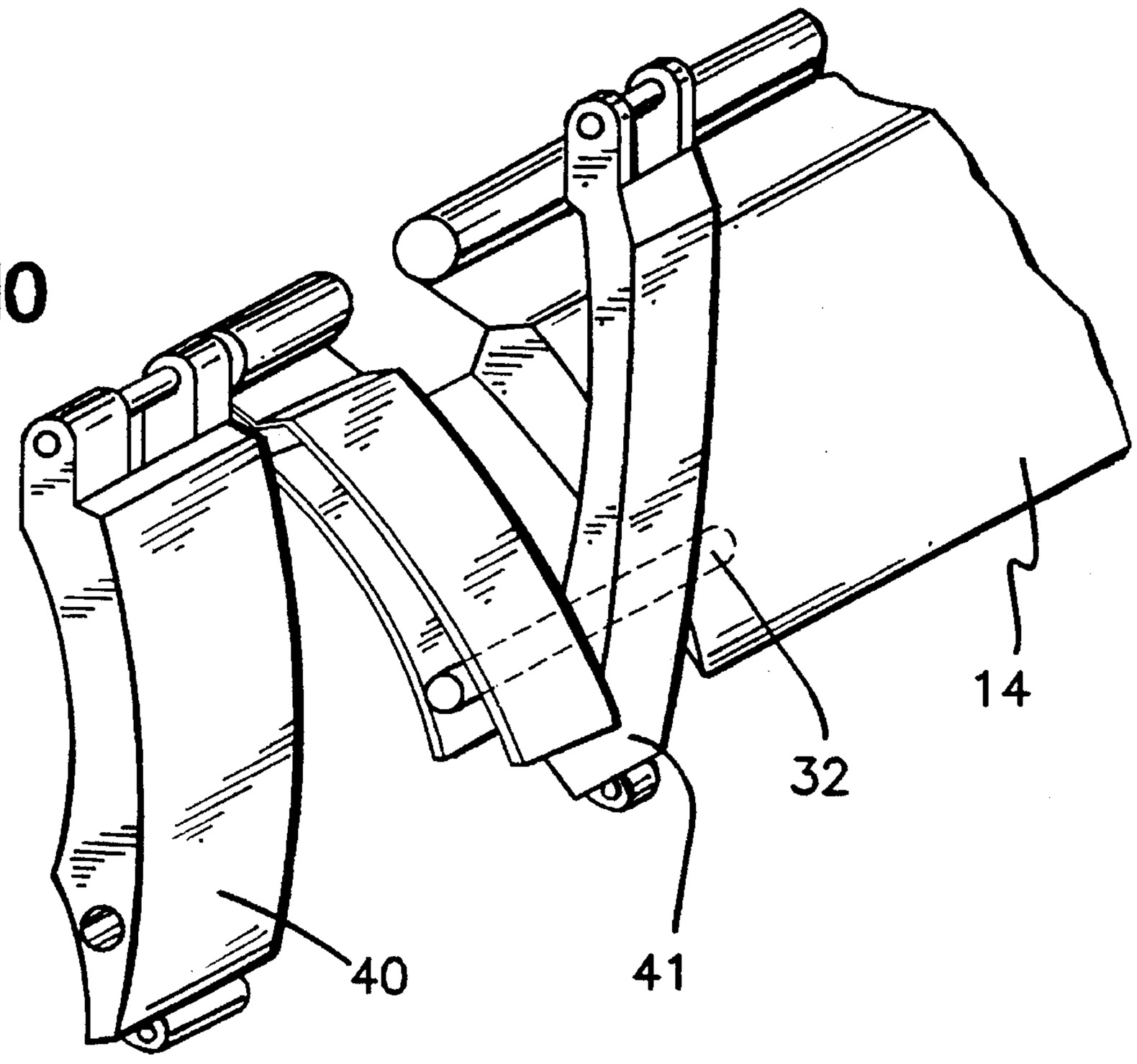


FIG. 11

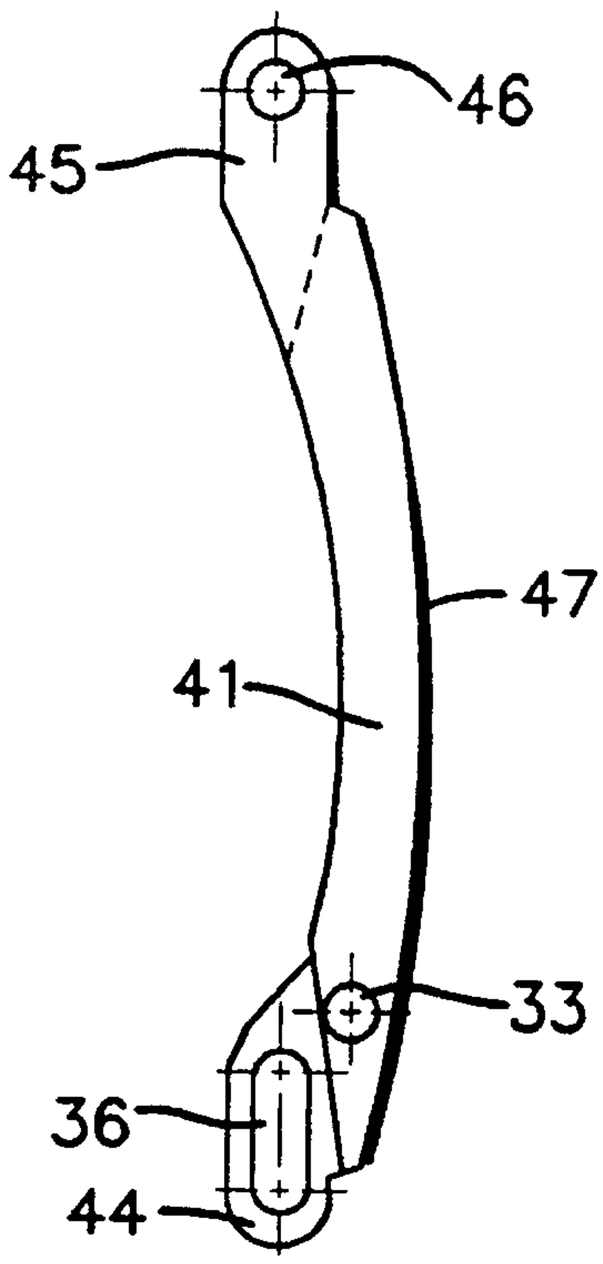


FIG. 12

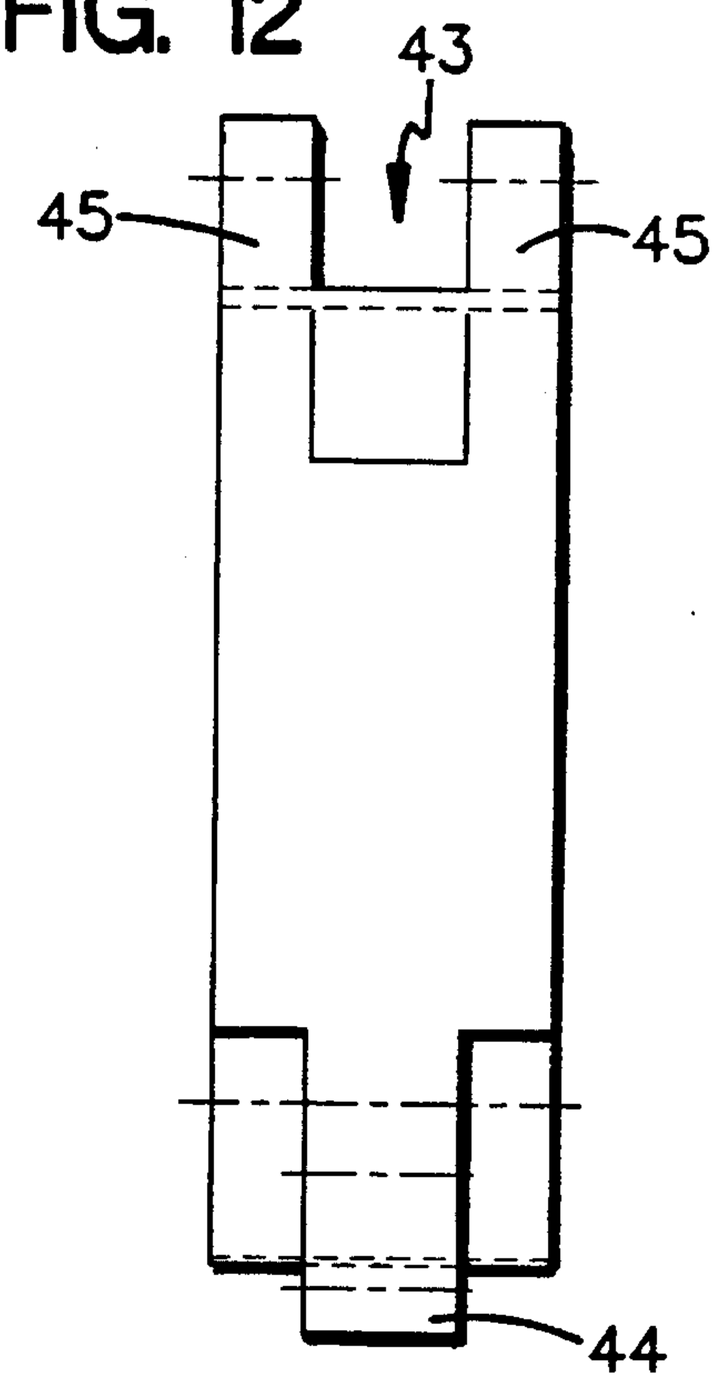


FIG. 13

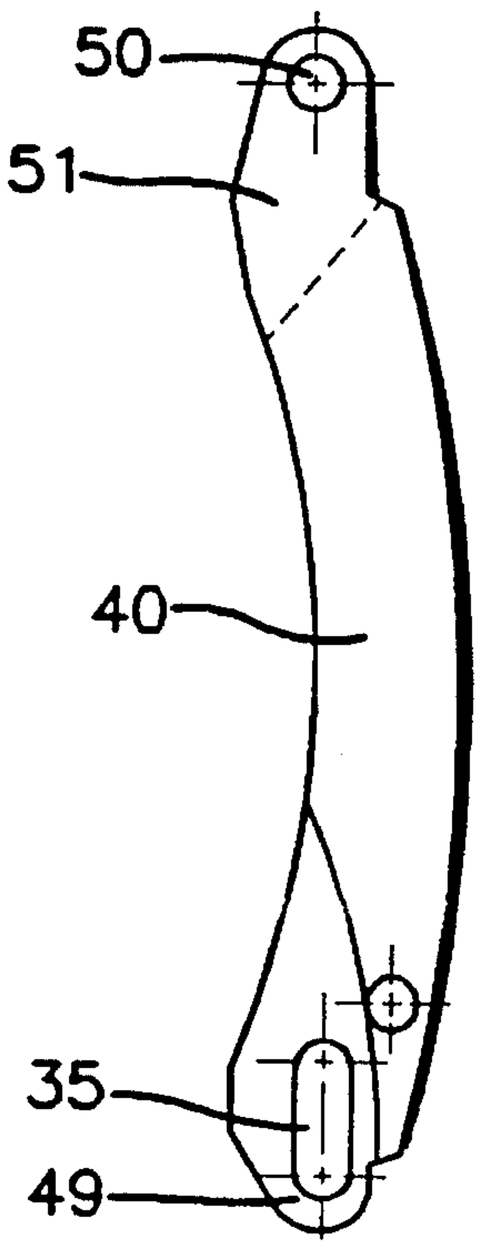
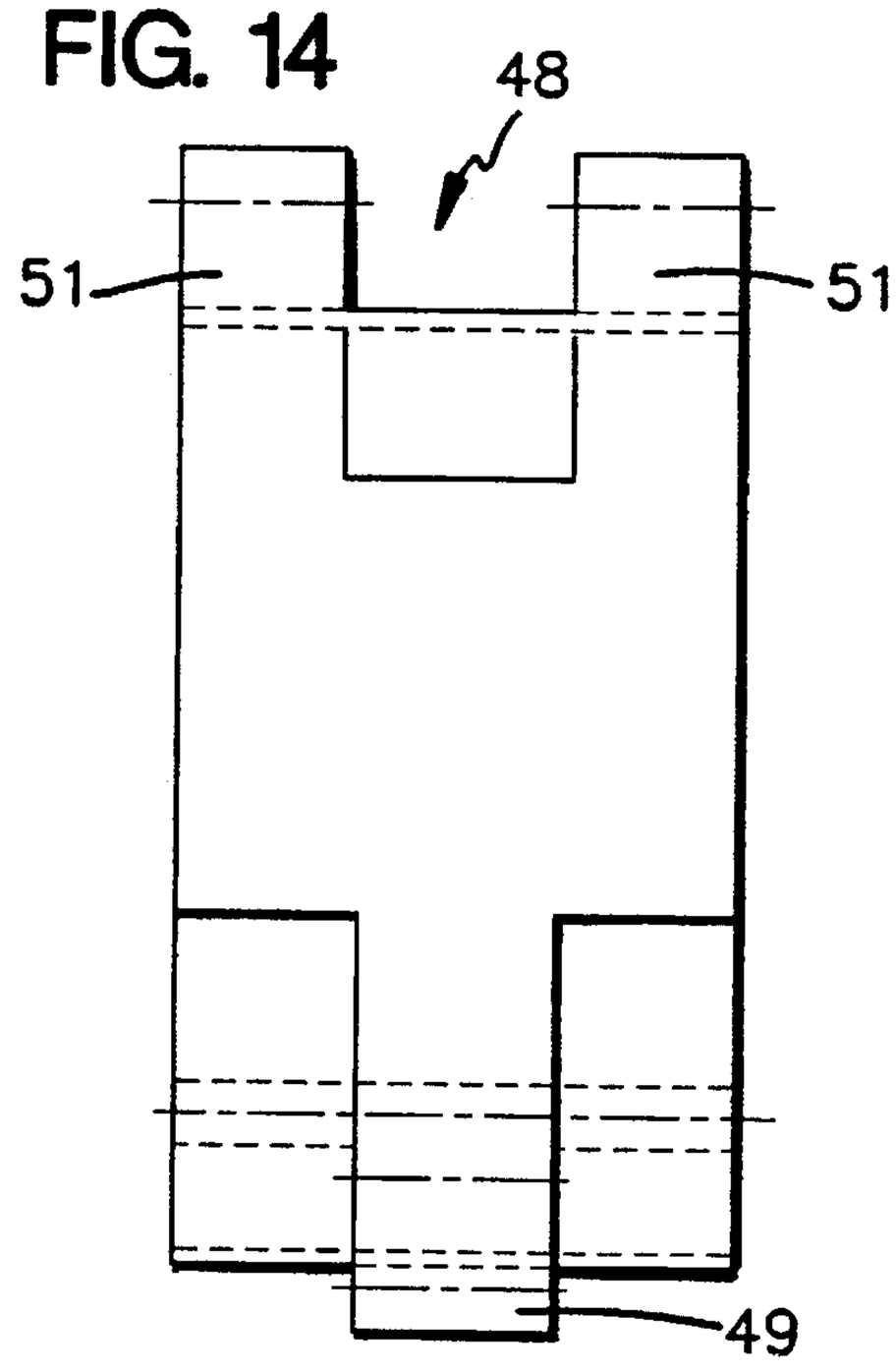


FIG. 14



LOUVERABLE ROLLER BLIND

BACKGROUND OF THE INVENTION

1. Field of the Invention.

The invention relates to a roller blind with louverable, lamellar blind slats, which in their upper areas are connected in a hinged manner with elements of a pull chain connected with one another in a hinged manner and in their lower areas with elements of an adjusting chain connected with one another in a hinged manner and are guided laterally in stationary guide profiles, in which the connecting pins of the adjusting chain elements with the blind slats are at a distance from the plane in which the hinge pins of the adjusting chain elements lie.

2. Description of the Related Art.

Such a roller blind is known, for example, from EP-A 382 172. In such roller blinds, it is desirable that, on the one hand, they can be rolled up in the roller housings problem-free and in as space-saving a manner as possible and that, on the other hand, the replacement of non-louverable roller blinds already present in buildings by louverable roller blinds is possible without great changes. In other words, the existing guideways must neither be moved nor replaced by others with larger dimensions. In addition, such roller blinds should consist of as few individual parts as possible and should be able to be produced economically.

The roller blind known from EP-A 382 172 exhibits two disadvantages in this respect. In the first place, it is necessary that the guide profiles must be at a certain distance from the window or door frames or the like, since the blind slats when louvered are not only swiveled outward but also project inward over the guide profiles to a certain extent, which is connected with the special arrangement of the pivot bearings of the blind slats. In the second place, the roller blind according to EP-A 382 172 consists of relatively many individual parts, which has a disadvantageous effect on the production costs.

SUMMARY OF THE INVENTION

The object of the invention is therefore, on the one hand, to make available a roller blind which does not exhibit any parts that can be moved inward, i.e., toward a window or a door or the like, and which, on the other hand, can be produced simply and economically. In this case, the roller blind should be able to be rolled up in the roller housing problem-free and with as small a space requirement as possible.

This object according to the invention is achieved in that the pins of the hinges, by which the pull chain elements and the adjusting chain elements are connected with one another, and the swivel pins of the blind slats in the non-louvered state of the roller blind are aligned with one another.

Because the swivel pins of the blind slats are aligned with the hinge pins of the pull chain elements and the adjusting chain elements and can be moved on the upper edge of the blind slats, the upper area of the blind slats is no longer swiveled inward when the latter are louvered. Another advantage, which is produced by the invention, is that the blind slats can be swiveled by the alignment of the pins in the non-louvered state of the roller blind together with the pull chain elements and adjusting chain elements assigned to them and consequently can be rolled up in the roller housings in a very space-saving manner and problem-free. Another advantage is that a single bearing pin, i.e., a single

bearing bolt, can be used for the swivel pins of the blind slats on the pull chain elements and the connecting hinge of two adjacent pull chain elements, by which both the number of components of the roller blind and its production costs can be reduced.

Because the connecting pins of the adjusting chain elements with the blind slats are at a distance from the plane in which the hinge pins of the connecting elements lie, a lever action on the blind slats results, so that the latter can be louvered without problems and additional devices, when the adjusting chain is held or operated by a suitable device.

A preferred embodiment of the invention is characterized in that grooves running crosswise to the longitudinal axis of the blind slats are provided in the louverable blind slats in the area of their ends, in which the adjusting chain elements are essentially completely incorporated in the non-louvered state of the roller blind. Such a groove can be produced in a simple way in the blind slats, e.g., by milling out the corresponding area of the blind slat, and a stable and space-saving accommodation for the pull chain elements is provided.

A possibility according to the invention to guide the roller blind in the stationary guide profiles is characterized in that the blind slats are guided over the pull chain elements in the stationary guide profiles. The blind slats can be simply cut off straight at their ends in this case and the directly adjoining pull chain elements form the guideway in the guide profiles.

Another possibility according to the invention is that the area of the blind slats, in which the swivel pin of the blind slats is incorporated, is extended in the longitudinal direction of the blind slats and that the blind slats are guided by this extension as well as the pull chain elements in the stationary guide profiles. This embodiment offers an even more stable guiding of the blind slats in the guide profiles, since they engage with their extensions directly in the guide profiles.

An especially preferred embodiment of the invention is characterized in that the pull chain elements and/or the adjusting chain elements are produced from extruded profiles. The production of the pull chain and adjusting chain elements from extruded profiles offers the advantage that the outside contour of the pull chain and adjusting chain elements can be matched exactly to the outside shape of the blind slats, so that a continuous, essentially smooth surface of the roller blind is formed without interruptions. The production of the pull chain and adjusting chain elements from extruded profiles in addition offers a significant cost advantage, since extruded profiles can be further processed advantageously and in a simple way.

It can be advantageous in particular in wide roller blinds if at least one center carrying chain is provided, which is designed essentially like the pull chains, so that the blind slats, especially if they are louvered, i.e., swiveled out, do not sag by their own weight, which, on the one hand, is unsightly and, on the other hand, can result in malfunctions.

In this case, the invention can preferably be further developed so that on the side of each blind slat facing away from the outside facade, a number of grooves corresponding to the number of center carrying chains is provided, in which the chain elements of the center carrying chains are essentially completely incorporated. In this case, the center carrying chain is not visible from outside, when the roller blind is closed and furthermore hardly gets in the way when the roller blind is cleaned from inside.

It is especially preferred according to the invention if the pull chain elements, the adjusting chain elements, the center

carrying chain elements and/or the blind slats are produced from metallic material, preferably aluminum.

Roller blinds or parts of roller blinds are often produced from plastics. But in the case of sunshade systems, the latter are exposed to very high UV-radiation values as well as atmospheric pollutants, heat and cold, which very greatly reduces the service life of plastic parts. Moreover, metallic materials, with often lower costs, in most cases exhibit higher strength values than plastic parts, and also the tool costs for the production of the parts in the case of plastic in most cases are significantly higher. An extrusion die, for example, costs approximately only 10% of a plastics die. By the simple configuration, according to the invention, of the individual parts of the roller blind, it is possible to produce all parts from metal, preferably from extruded or rolled metal, by which the parts made of plastic encumbered with the mentioned drawback can be replaced.

BRIEF DESCRIPTION OF THE DRAWINGS

Further features and advantages of the invention follow from the description of preferred embodiments of the invention with reference to the drawings, in which

FIG. **1** represents a side view of a roller blind in the louvered state in accordance with arrow I in FIG. **4**,

FIG. **2** represents a section through the louvered roller blind in the direction of arrow II in FIG. **4**,

FIG. **3** represents a section through the louvered roller blind in the direction of arrow III in FIG. **4**,

FIG. **4** shows a front view of a part of a roller blind with non-louvered blind slats,

FIGS. **5**, **6** and **7** show the cross section of a blind slat along lines I, II and III in FIG. **4**,

FIG. **8** shows a further embodiment of a blind slat cross section,

FIG. **9** shows a further embodiment of the roller blind according to the invention in a view corresponding to FIG. **4**,

FIG. **10** is an oblong view sketch, from which the mode of operation of the roller blind according to FIG. **9** can be seen,

FIG. **11** shows an adjusting chain element of the roller blind according to the invention,

FIG. **12** is a view of the adjusting chain element from the left of FIG. **11**,

FIG. **13** shows a pull chain element of the roller blind according to the invention, and

FIG. **14** shows the pull chain element of FIG. **13** in a view from the left of FIG. **13**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to FIGS. **1** to **4**, an embodiment of the invention is explained below, and in FIG. **1**, only pull chain elements **21** are represented, in FIG. **2**, only adjusting chain elements **23**, and in FIG. **3**, only center carrying chain elements **29** of the roller blind. It is also pointed out that in FIG. **4**, drawn-in references I, II and III show how the sections according to FIGS. **1**, **2** and **3** are guided, but in FIGS. **1** to **3**, the roller blind is shown in the louvered state, and in FIG. **4**, the roller blind is shown in the non-louvered, i.e., closed state.

As can be seen from FIG. **1**, a pull chain for the roller blind is made from pull chain elements **21**, which are connected with one another by pins **16**. For this purpose, pull chain elements **21** exhibit a bore on one end and an elongated hole **35** on their other end, whose function will be explained later. Pins **16** simultaneously also form the swivel pins for blind slats **14**, which are connected in a hinged manner by pins **16** with pull chain elements **21**.

From FIG. **4**, it can be seen that blind slats **14** exhibit a part **17** projecting in the area of pin **16** and that this projecting part **17** as well as pull chain elements **21** are guided in a diagrammatically indicated stationary guide profile **31**.

At some distance (for example 20 to 30 mm) from the end of blind slat **14**, i.e. from the free end of projecting part **17** and pull chain **21**, a groove **24** is provided in blind slat **14**, whose course is also represented in FIG. **6**. In this groove, adjusting chain elements **23** forming a pull chain are incorporated, which are connected with one another by hinge pins **30**. Adjusting chain elements **23** exhibit a bore on one end and an elongated hole **36**, as seen in FIG. **2**, on the other end just like pull chain elements **21**.

Adjusting chain elements **23** in FIG. **2** in addition exhibit a bore **33**, which does not lie in the common plane of hinge pins **30** and is at a distance from the latter, preferably 4 to 5 mm. Each adjusting chain element **23** is connected by a connecting pin **32** with a blind slat **14**, which is guided through bore **33** in each adjusting chain element **23** and is incorporated in a bore **22**, seen only in FIG. **6** or the like in blind slat **14**.

If the roller blind exceeds a certain width, one or more center carrying chains can be provided, which are composed of chain elements **29**, shown in FIGS. **3** and **4** whose shape corresponds essentially to the shape of pull chain elements **21**, with the exception that their width is smaller viewed crosswise to the longitudinal axis of blind slat **14**. Blind slats **14** exhibit a groove **53**, whose course can be seen only in FIG. **7**, on their rear side **25**, i.e., the side facing away from the outside facade. Groove **53** and chain elements **29** of FIG. **3** are designed so that chain elements **29** are essentially completely incorporated in groove **53** on rear side **25** of blind slats **14**. The same also applies to adjusting chain elements **23** of FIG. **2** on the front side of blind slats **14**, so that in the roller blind according to the invention, no parts projecting over the outside contour of blind slats **14** are present, when the roller blind is not louvered.

As can be seen best of all from FIG. **4**, pins **16** of pull chain elements **21** as well as hinge pins **30** of adjusting chain elements **23** and pins **37** of center carrying chain elements **29** are aligned when the roller blind is not louvered. This entails a very considerable advantage if the roller blind is wound up on a shaft in the roller housing. Because all above-mentioned pins **16**, **30** and **37** are aligned, individual blind slats **14** and corresponding chain elements **21**, **23**, **29** can be swiveled around a single, common pin, by which, on the one hand, a complete absence of stress of the roller blind is assured and, on the other hand, no swiveling-out parts of blind slats **14** are present, which would increase the winding diameter when the roller blind is wound up.

But because connecting pins **32**, shown in FIGS. **2** and **4** by which adjusting chain elements **23** are connected with blind slats **14**, do not lie in the common plane of hinge pins **30** of individual adjusting chain elements **23**, but are shifted outward, it is assured that blind slats **14** can be louvered without problems and additional auxiliary devices. In particular by pulling on the adjusting chain in an upward

direction, or if the adjusting chain is held in place and the roller blind is further lowered, as this is known, for example, from EP-A 382 172, a lever arm is formed between connecting pins **32** and the hinge pins **30** of adjusting chain element **23** on each blind slat **14**. Such lever arm assures the swiveling-out of blind slats **14**.

As can be seen from FIGS. **1** to **4**, chain elements **21**, **23** and **29** are produced from plate-shaped parts and, for example, punched out of sheet steel.

Another embodiment of the invention is represented in FIGS. **9** to **14**, in which pull chain elements **40**, adjusting chain elements **41**, and center carrying chain elements **42** are produced from extruded profiles, for example, from aluminum. Blind slats **14** of this embodiment are designed essentially the same as the blind slats **14** of the embodiment according to FIGS. **1** to **4**, with one exception, that projection **17**, with which blind slats **14** project in stationary guide profiles **31**, is not present and blind slats **14** thus exhibit a straight end.

In FIGS. **11** and **12**, an adjusting chain element **41** produced from an extruded profile is represented, which exhibits a forked recess **43** on one side and a projection **44** on the other end. An elongated hole **36** is arranged in projection **44** and bores **46** are provided in flanges **45** limiting forked recess **43**. To form an adjusting chain, projection **44** of the adjusting chain element **41** can be moved into forked recess **43** of next adjusting chain element **41** and can be connected with one another by a pin **30**, shown in FIG. **9**, which penetrates elongated hole **36** and bores **46**.

In the area of the lower end of adjusting chain element **41**, as seen in FIG. **11**, another bore **33** is provided, by which adjusting chain element **41** can be connected in a hinged manner, shown in FIG. **9** with a blind slat **14** by a connecting pin **32**.

The production of adjusting chain elements **41** can be performed especially economically, since forked recess **43** or projection **44** of FIG. **12** can be produced by simple milling out of the foundation of adjusting chain element **41**.

The cross section shape of adjusting chain element **41** is such that, as seen in FIG. **9**, it can be completely incorporated in groove **24** in blind slat **14**, and concave side **47** of FIG. **11** showing adjusting chain element **41** is aligned with the concave outside surface of blind slat **14**, in which it is incorporated, when the roller blind is not louvered.

Pull chain element **40**, which is represented in more detail in FIGS. **13** and **14**, is structured corresponding to adjusting chain element **41** of FIGS. **11** and **12**, and exhibits a forked recess **48** with bores **50** in flanges **51** as well as a projection **49** with an elongated hole **35**. The cross section shape of pull chain element **40** corresponds essentially to the cross section shape of the blind slats **14** of FIG. **9**.

Center carrying chain elements **42** are also structured similar to pull chain elements **40** and adjusting chain elements **41**, which, however, is not represented in detail in the drawings.

As can be seen from FIG. **9**, the roller blind is guided over pull chain elements **40** in the stationary guide profile **31**. In addition, it is discernible from FIG. **9** and FIG. **10** that pins **16**, **30** and **37** are aligned just like in the embodiment according to FIGS. **1** to **4** with non-louvered blind slats **14**, so that the roller blind can be wound up problem-free in the roller housings. The embodiment according to FIGS. **9** to **14** in addition exhibits the advantage that the outside and the inside surface of the roller blind is essentially smooth and continuous, if the roller blind is not louvered, i.e., is closed, which, on the one hand more visually pleasing and, on the other hand, offers advantages in the cleaning of the roller blind.

In FIGS. **5** to **7**, a profile of a blind slat **14** is represented, which is preferably extruded from aluminum. The profile exhibits three chambers **18**, **20** and **28**, and a stiffening of the profile is provided by flanges **15**, **26** and **27**, which is especially advantageous in those areas in which grooves **24** and **53** are provided for either adjusting chain elements **23**, **41** or carrying chain elements **29**, **42**. The profile of blind slat **14** in FIG. **5** in addition exhibits a groove **54** on a longitudinal edge and a spring **55** designed as a catch on the opposite longitudinal edge, in which pin **16** also is incorporated in a recess **19**, which are combined as a groove-spring connection when the roller blind is closed and lowered.

In this connection, elongated holes **35**, **36** and **52** in the chain elements of FIGS. **13**, **11** and **3**, respectively are also important, since the latter make it possible for the chains to be telescoped when they are precisely aligned to one another, so that groove-spring connection **54**, **55** of FIG. **5** can be brought into its operative position.

In FIG. **8**, another embodiment of an extruded profile for blind slats **1** is represented, but which essentially corresponds to the profile according to FIGS. **5** to **7**, in which, however, no stiffening ribs are provided.

For pins **16**, **30**, **32** and **37**, of FIGS. **1–4**, rivets or pins pressed into the individual components can be used as required. As pin **16**, for example, a tubular rivet or a pin provided on one end with a bore and on the other end with a head can be used. The end opposite the head of the rivet or pin can be compressed after the incorporation either in groove **24** (FIG. **4**) or inside blind slat **14** (FIG. **9**), by which the pin or rivet is axially secured, but is rotatable.

As pin **30**, e.g., a smooth pin can be used, and either its ends can be compressed (FIG. **4**) or the external openings of bores **46** (FIG. **11**) can be compressed after its incorporation. Also, pin **32** in FIGS. **9** and **10** remains rotatable here, but is axially secured.

A smooth pin, e.g., can also be used as pin **37**, and in its axial securing, the areas of the bores in addition to pin **37** in FIG. **9** can be compressed from outside by compression molding dies, by which this pin **32** is also secured against axial shifting, but remains rotatable.

Only the left part of a roller blind was represented and described in the description and in the drawings. But the opposite side of the roller blind is designed mirror-image to the represented side and no more than one center carrying chain element **29** or **42**, can be provided.

I claim:

1. A louverable roller blind comprising:

stationary guide profiles (**31**);

pull chain elements (**21**, **40**) connected with one another in a hinged manner via first hinge pins (**16**);

adjusting chain elements (**23**, **41**) connected with one another in a hinged manner via second hinge pins (**30**), lying in a plane;

lamellar blind slats (**14**) guided laterally in the stationary guide profiles, and connected in a hinged manner in their upper areas with the pull chain elements (**21**, **40**) via said first hinge pins and in their lower areas with the adjusting chain elements (**23**, **41**);

pin means (**32**) for connecting the adjusting chain elements (**23**, **41**) with the lamellar blind slats (**14**) at the distance from said plane; and

whereby the first hinge pins (**16**) and the second hinge pins (**30**) are aligned with one another in a non-louvered state of the roller blind.

2. Roller blind according to claim **1**, wherein grooves (**24**) running crosswise to a longitudinal axis of the blind slats (**14**) are provided in the blind slats (**14**) in an area of their ends, in which the adjusting chain elements (**23**, **41**) are essentially completely incorporated in the nonlouvered state of the roller blind.

3. Roller blind according to claim **1**, wherein the blind slats (**14**) are guided over the pull chain elements (**40**) in the stationary guide profiles (**31**).

4. Roller blind according to claim **1**, wherein an extension area (**17**) of the blind slats (**14**), in which the first hinge pins (**16**) are incorporated, is extended in a longitudinal direction of the blind slats (**14**) and further wherein the blind slats (**14**) are guided over this extension area (**17**) and over the pull chain elements (**21**) into the stationary guide profiles (**31**).

5. Roller blind according to claim **1**, wherein the pull chain elements (**21**) and the adjusting chain elements (**23**) are formed from plate-shaped elements, which are aligned crosswise to the longitudinal direction of the blind slats (**14**).

6. Roller blind according to claim **1**, wherein the pull chain elements (**40**) and the adjusting chain elements (**41**) are produced from extruded profiles.

7. Roller blind according to claim **1**, wherein at least one center carrying chain element (**29**, **42**) is provided and is designed essentially like the pull chain elements (**21**, **40**).

8. Roller blind according to claim **7**, wherein, a side (**25**) of each blind slat (**14**) facing away from an outside facade, a number of grooves (**53**) corresponding to the number center carrying chain elements (**29**, **42**) is provided, in which the chain elements (**29**, **42**) are essentially completely incorporated.

9. Roller blind according to claim **1**, wherein one of two hinged lugs of connecting hinges for the pull chain elements (**21**, **40**) and the adjusting chain elements (**23**, **41**) has an elongated hole (**35**, **36**, **52**).

10. Roller blind according to claim **9**, wherein the blind slats (**14**) are provided with springs (**55**) on upper longitudinal edges and with corresponding grooves (**54**) on lower longitudinal edges.

11. Roller blind according to claim **1**, wherein the blind slats (**14**) exhibit a hollow chamber profile.

12. Roller blind according to claim **7**, wherein the pull chain elements (**21**, **40**), the adjusting chain elements (**23**, **41**), the center carrying chain elements (**29**, **42**), and the blind slats (**14**) are produced from metallic material.

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